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Lin

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(54) **HAND TOOL WITH LATCH STRUCTURE**

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B25B 15/02 (2006.01)

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CPC ***B25B 23/0035*** (2013.01); ***B25B 15/02*** (2013.01); *B25B 23/0042* (2013.01)

(58) **Field of Classification Search**
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USPC 81/438, 125, 436
See application file for complete search history.

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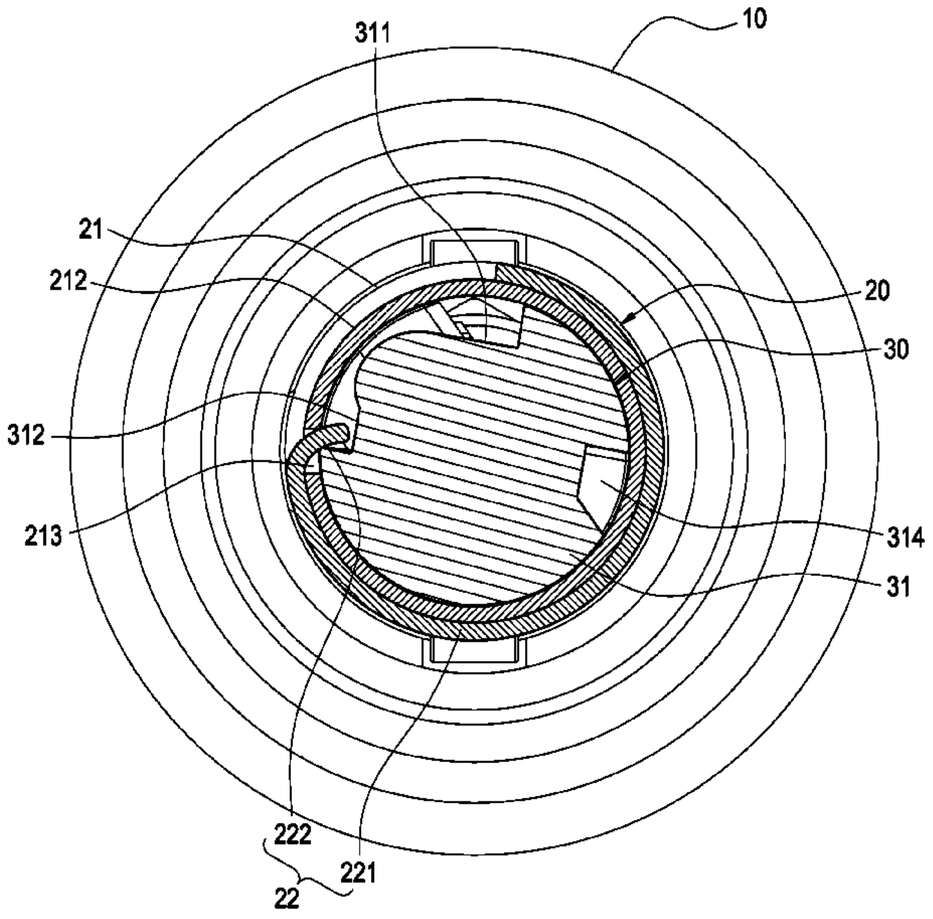
(57) **ABSTRACT**

A hand tool with a latch structure includes a main body (**10**) and a latch unit (**20**) coupled to the main body (**10**), and the latch unit (**20**) includes a rod body (**21**) and an elastic element (**22**). The rod body (**21**) has a center hole (**211**) formed in an axial direction parallel to the rod body (**21**) and a through hole (**213**) formed in an axial direction perpendicular to the rod body (**21**) and communicated with the center hole (**211**). The elastic element (**22**) has a circular plate (**221**) and a tongue (**222**) formed by bending from an end of circular plate (**221**), and the circular plate (**221**) is clamped outside the rod body (**21**), and the tongue (**222**) passes through the through hole (**213**) into the center hole (**211**) to achieve the effects of an easy installation and a secured latch.

8 Claims, 9 Drawing Sheets



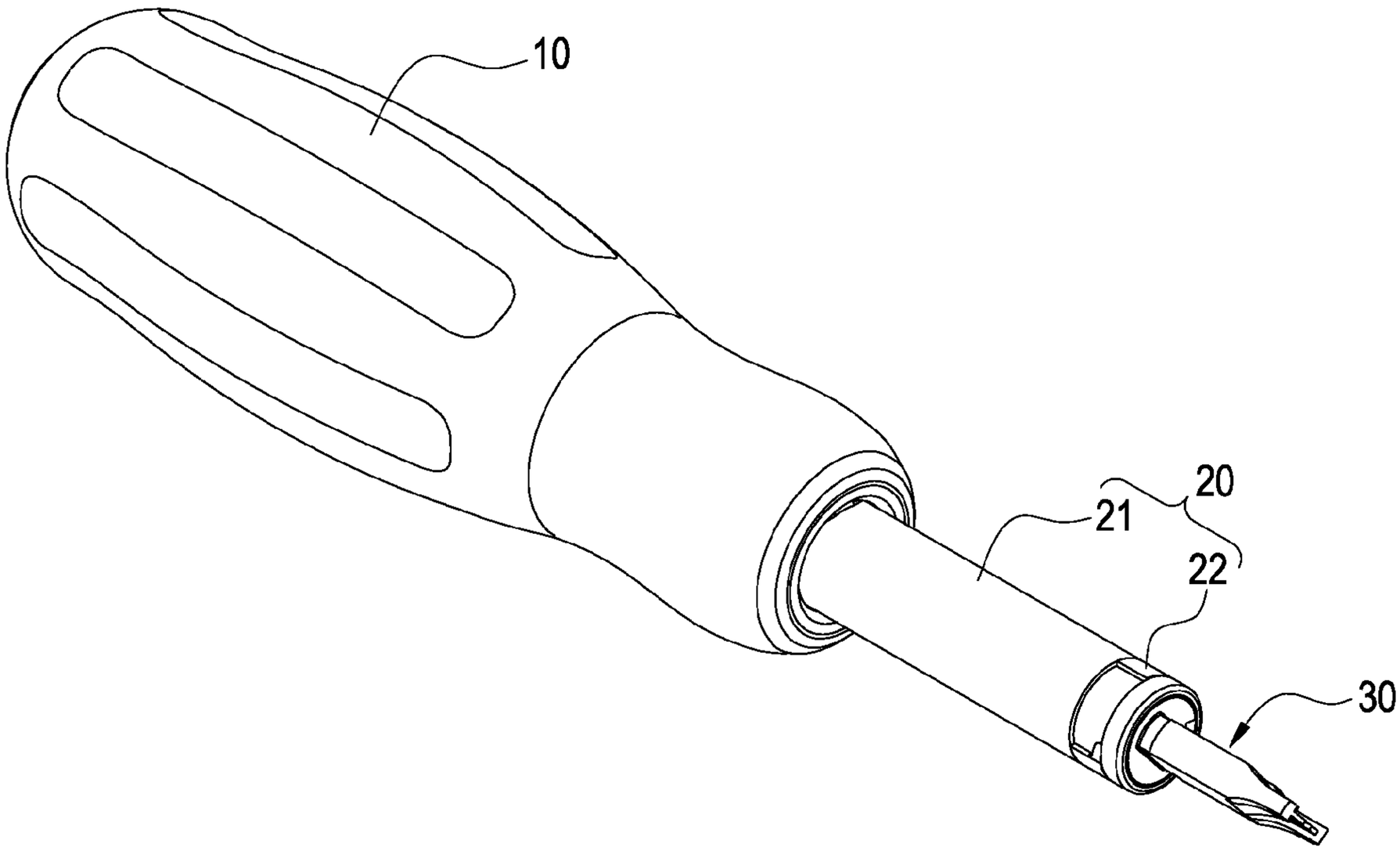


FIG.1

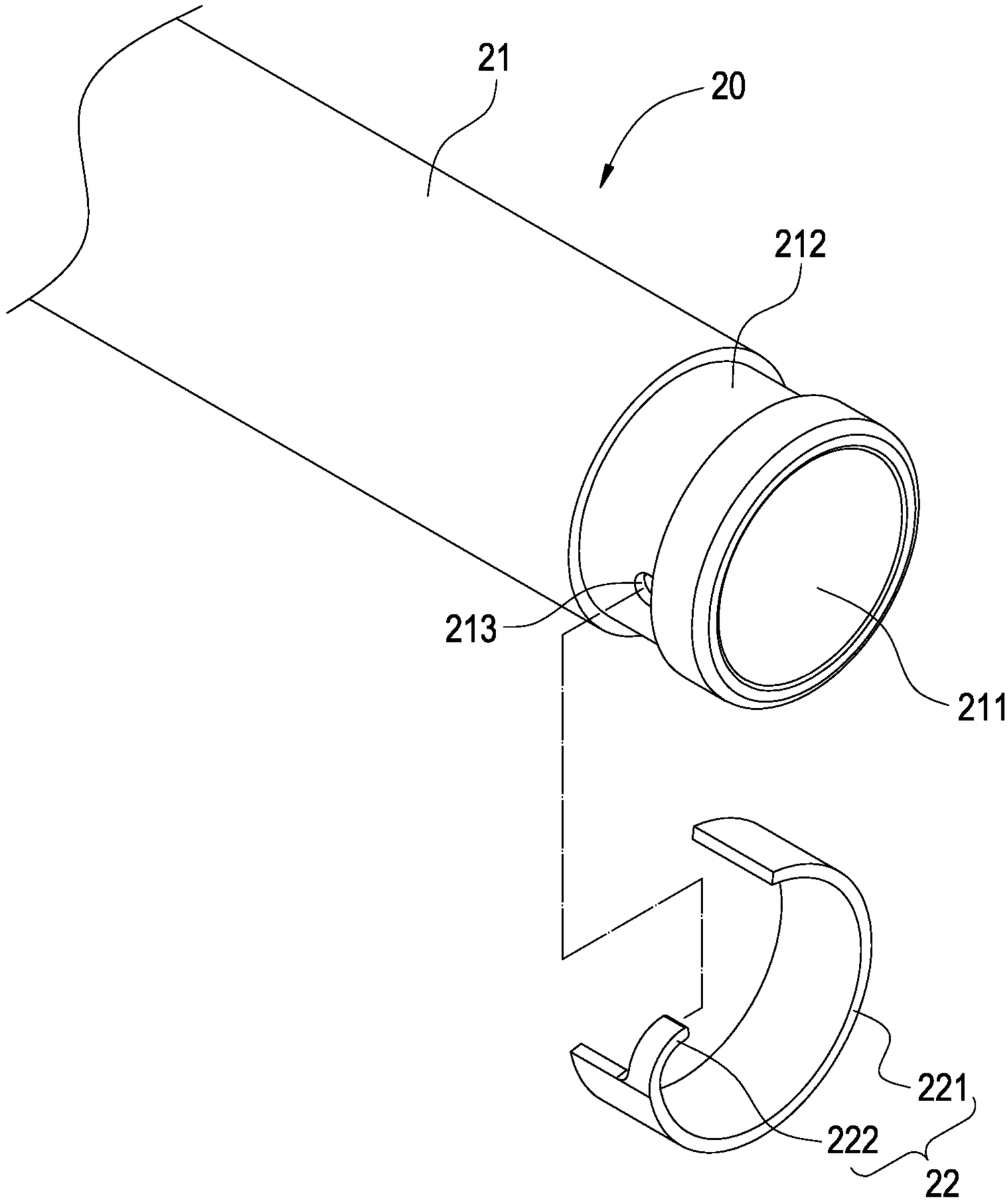


FIG.2

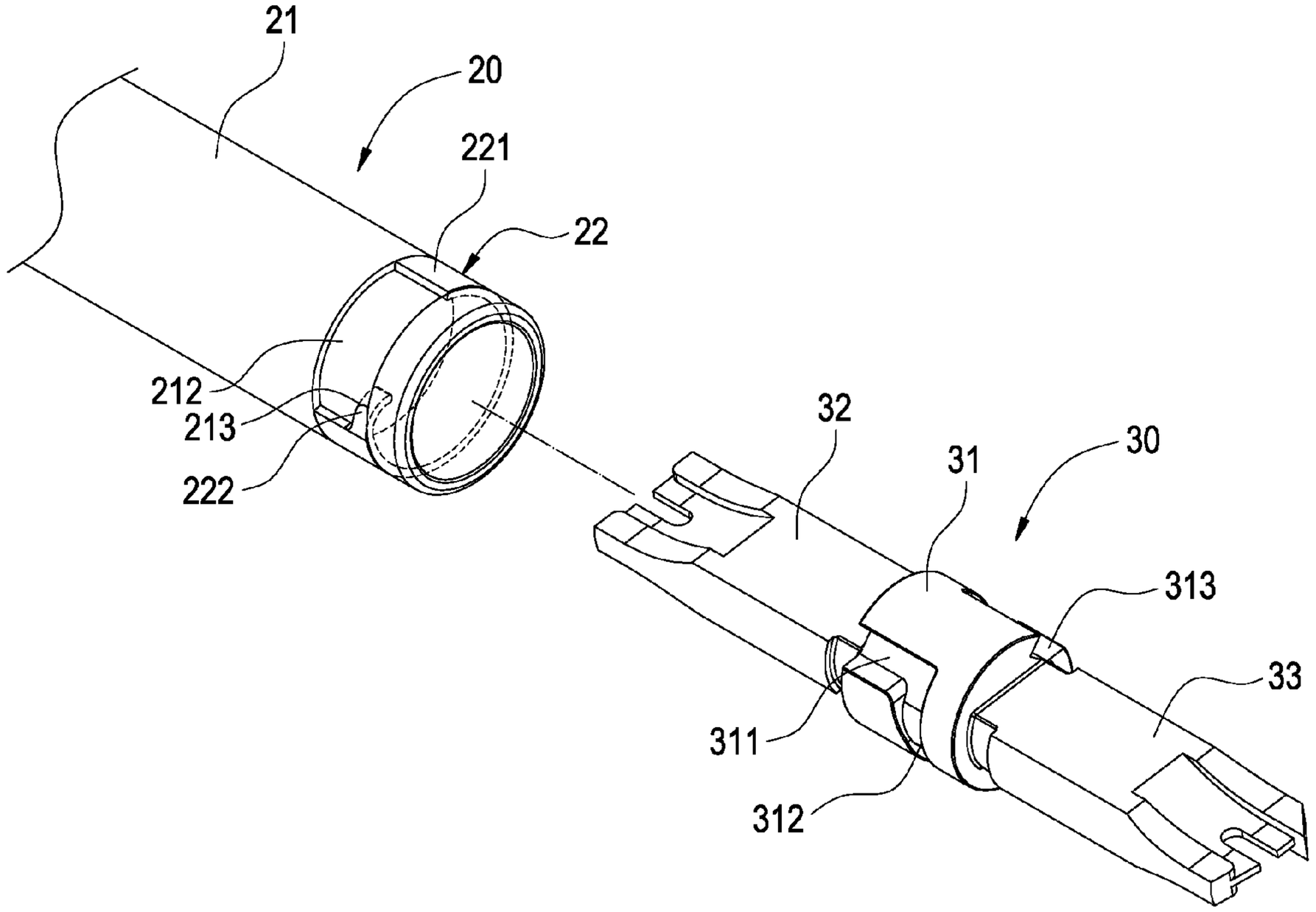


FIG.3

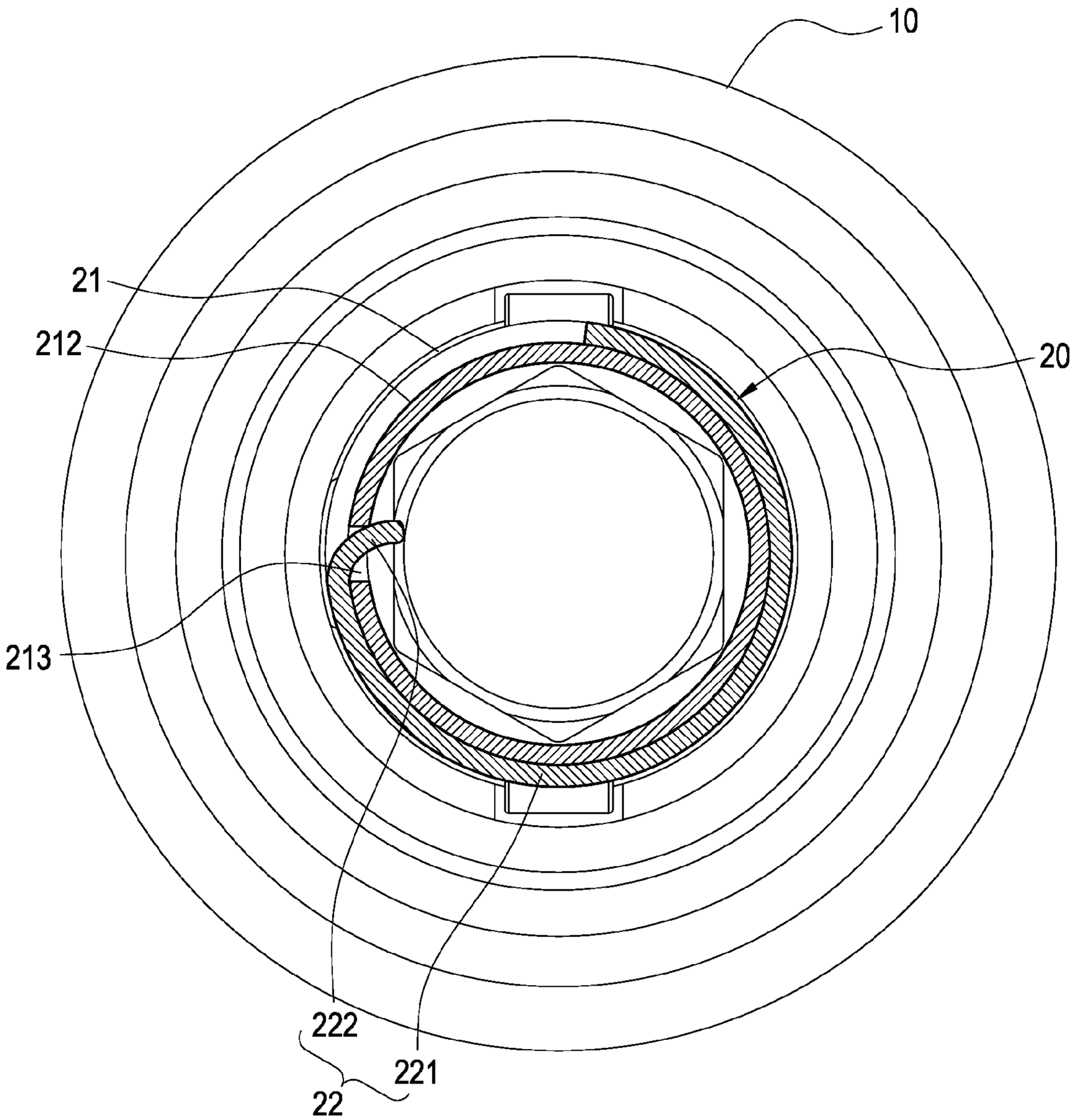


FIG.4

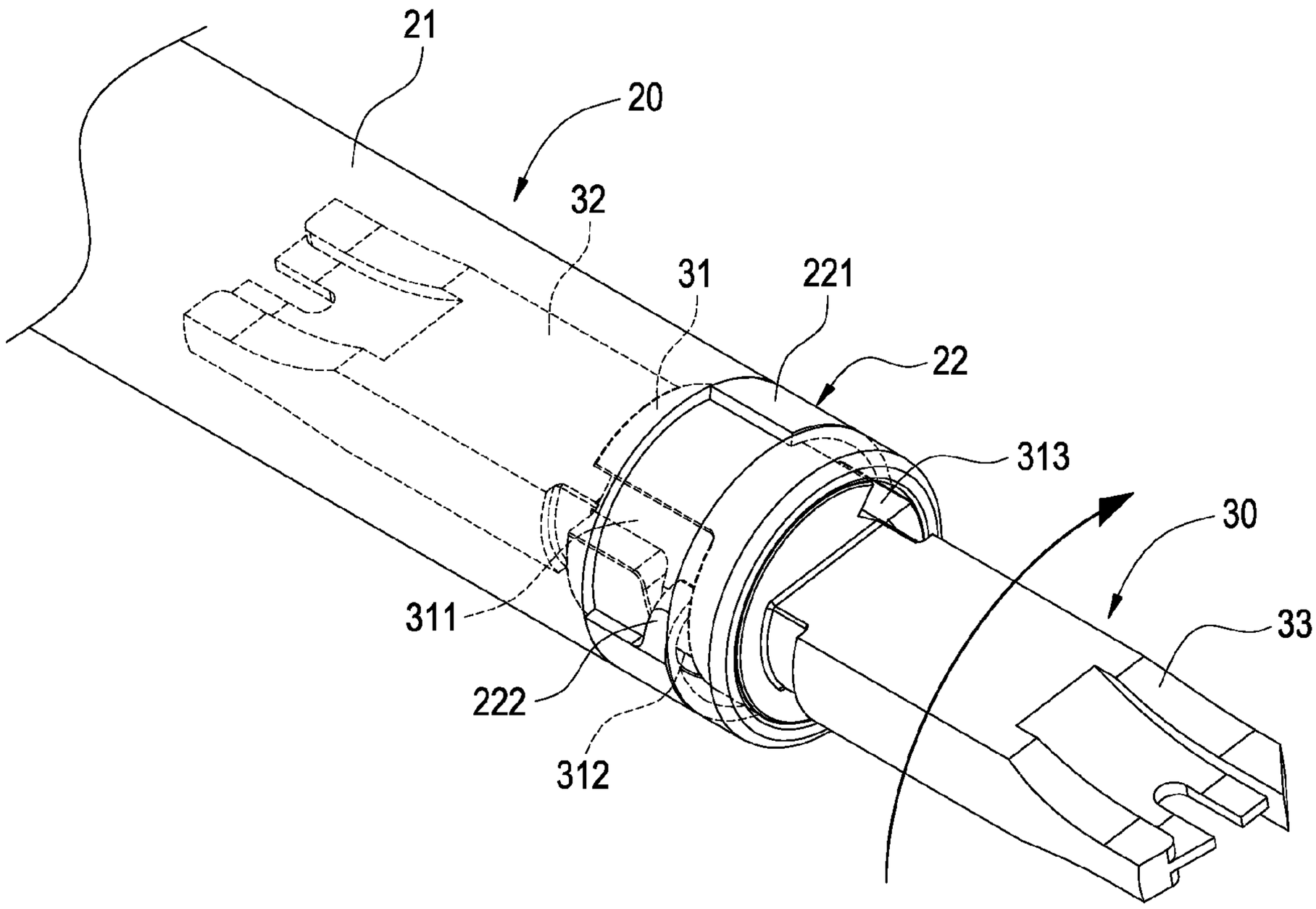


FIG.5

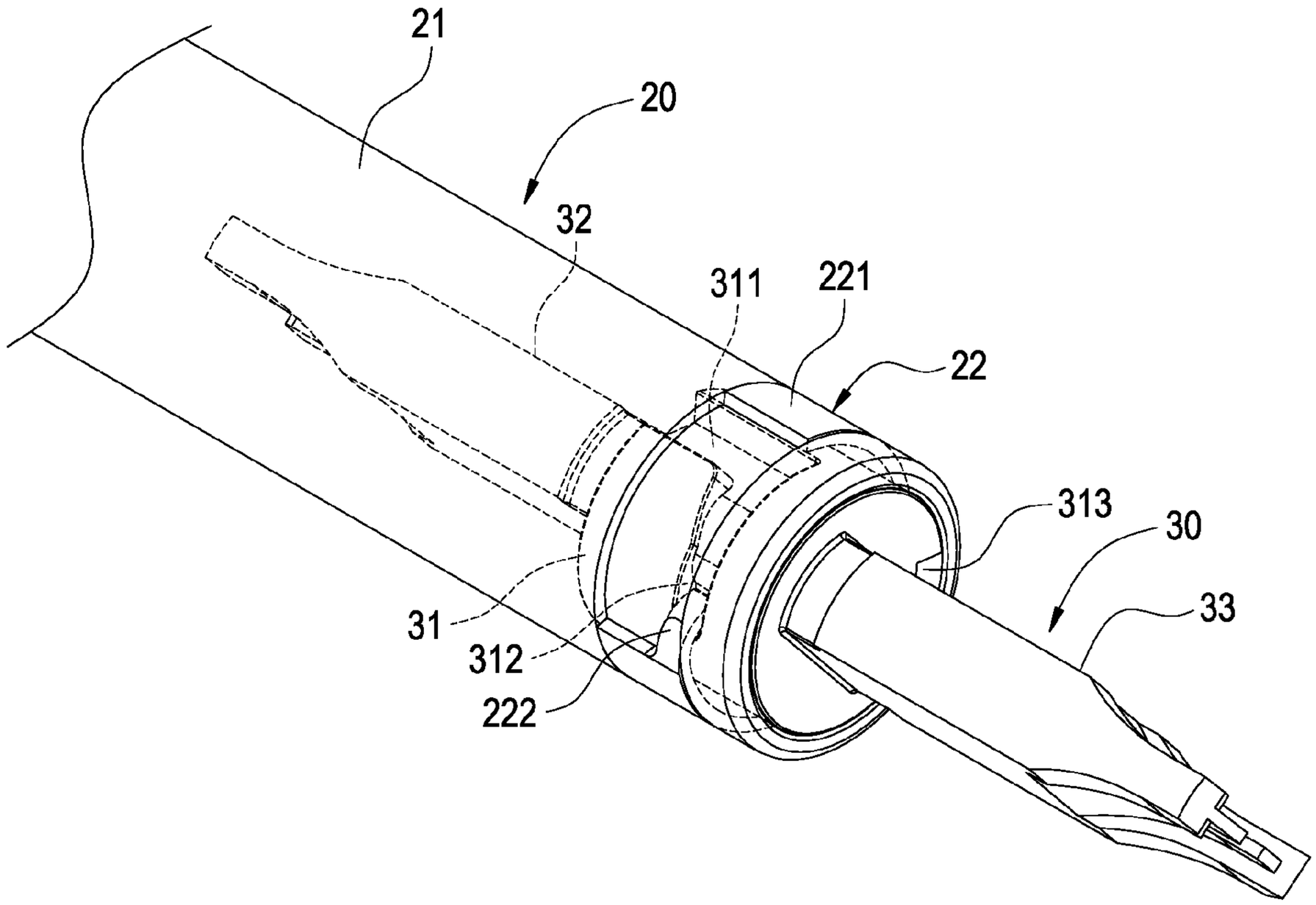


FIG.6

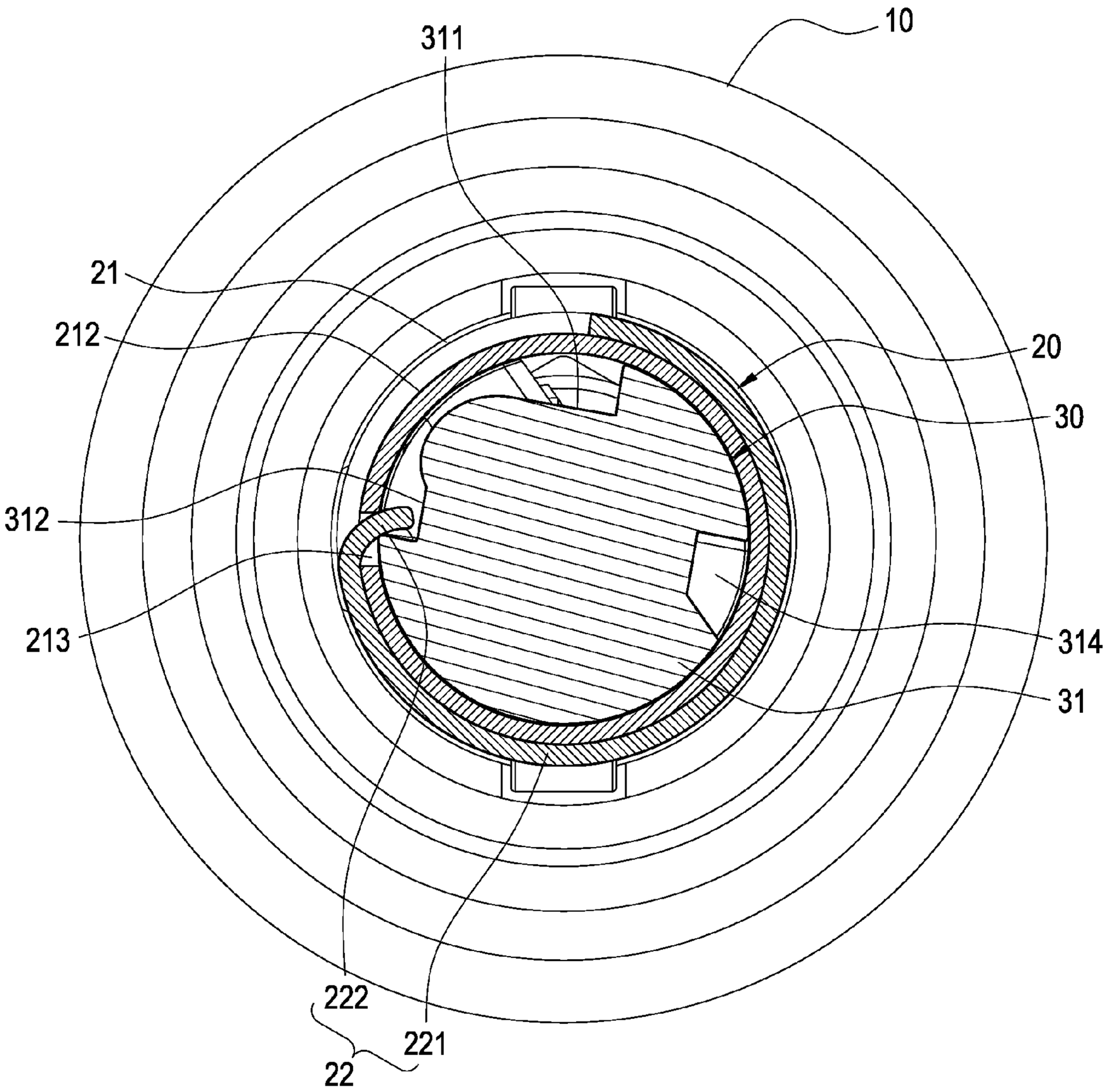


FIG.7

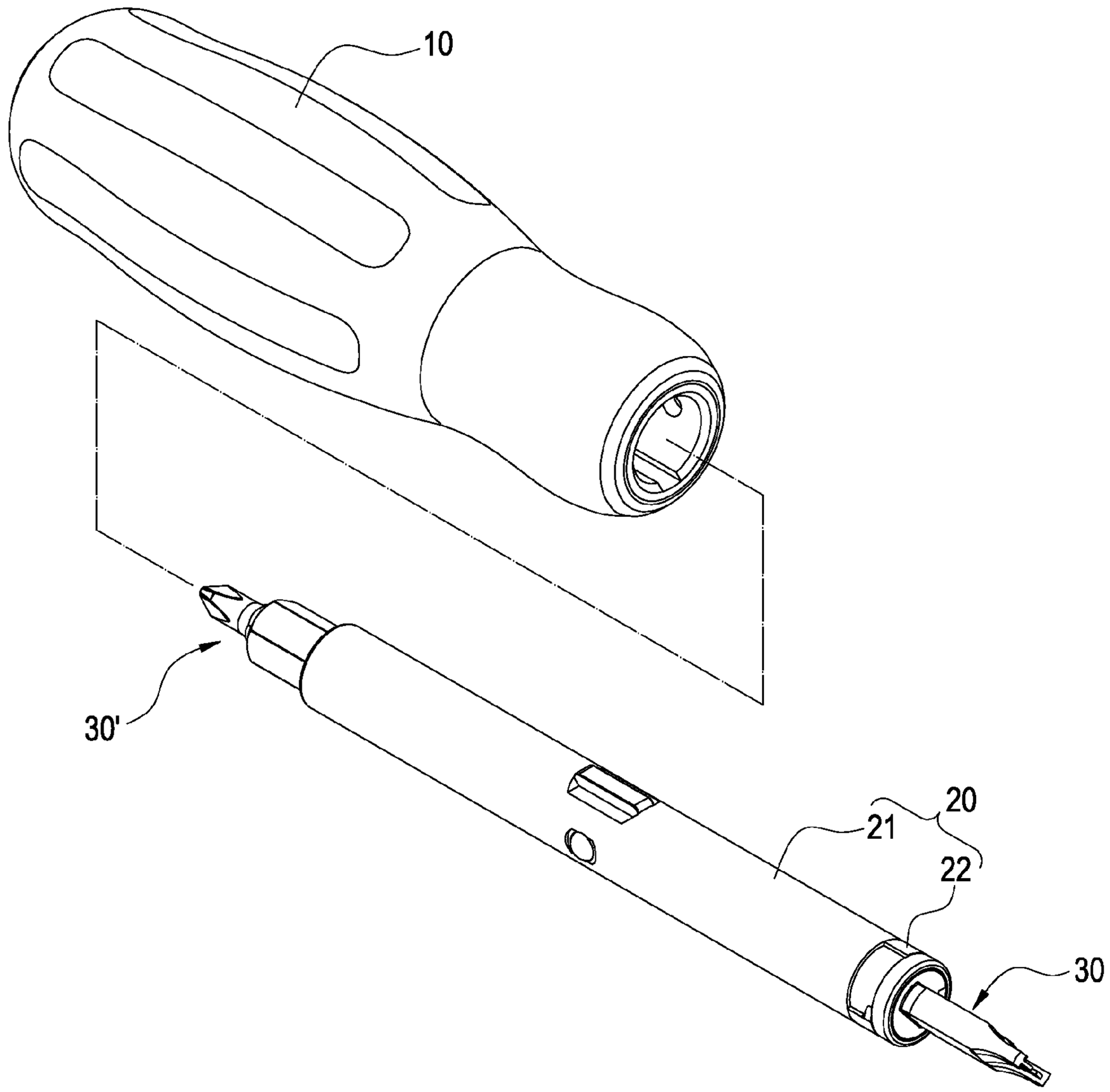


FIG.8

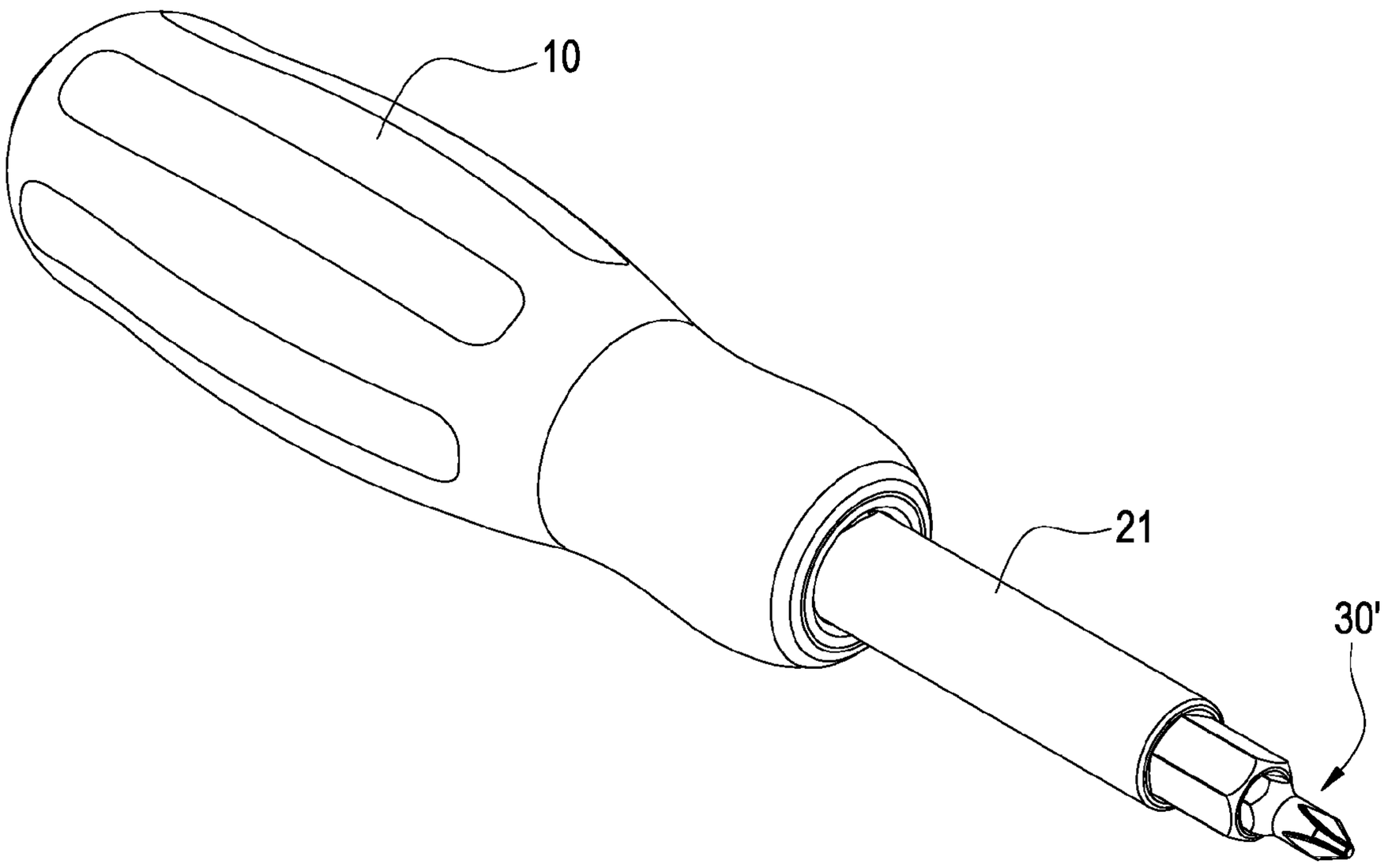


FIG.9

HAND TOOL WITH LATCH STRUCTURE

FIELD OF THE INVENTION

The present invention relates to a hand tool, and more particularly to the hand tool with a latch structure.

BACKGROUND OF THE INVENTION

In general, a conventional screwdriver combines a rod body with a handle to provide a rotational combination of a locking and positioning component such as a screw. To take the convenience of use into consideration, various types of detachable screwdrivers were developed, so that screwdriver heads of different specifications and shapes can be switched and used with a single handle to reduce the quantity of hand tools required by technicians significantly.

However, some of the conventional detachable screwdrivers adopt elastic plates and steel balls for a latch structure, and the hand tool with such latch structure has a relatively complicated and difficult assembling process, and the steel balls often fall out during an application. Since it is necessary to install the steel balls in the rod body, therefore the rod body has shortcomings of increasing its wall thickness, diameter and volume. Some other conventional detachable screwdrivers adopt wire spring for the latch structure, and the hand tools with such latch structure have the following shortcoming. The wire spring applies a very small pressure onto the screwdriver head, so that the screwdriver head often falls out during an application. Obviously, the conventional screwdrivers require improvements.

In view of the foregoing drawbacks of the prior art, the inventor of the present invention based on years of experience in the related industry to conduct extensive researches and experiments and provided a feasible solution to overcome the drawbacks of the prior art.

SUMMARY OF THE INVENTION

Therefore, it is a primary objective of the present invention to provide a hand tool with a latch structure, wherein a circular plate is used for clamping and a tongue is used for pressing in order to achieve the effects of an easy installation and a secured latch.

To achieve the aforementioned objective, the present invention provides a hand tool with a latch structure, comprising a main body and a latch unit coupled to the main body, wherein the latch unit includes a rod body and an elastic element, and the rod body has a center hole formed in an axial direction parallel to the rod body and a through hole formed in an axial direction perpendicular to the rod body and communicated with the center hole; and the elastic element has a circular plate and a tongue formed by bending from an end of the circular plate, and the circular plate is clamped outside the rod body, and the tongue is passed from the through hole into the center hole.

The present invention further has the following effects. The elastic element is clamped and fixed onto the rod body, so that a rod body of a small diameter can be selected and used to reduce the volume and lower the material cost. Without increasing the external diameter of the handle, the rod body can be inserted into the handle from both directions, and two screwdriver heads of different sizes can be used to improve the functionality of the screwdriver. The positioning slot not just restricts the axial movement of the circular plate only, but also provides a quick positioning effect in the assembling process. The plate structure of the elastic element has a better rigidity and provides the elastic force required for the clamping by the tongue. The guide slot and positioning pit are provided for facilitating the installation or removal of the screwdriver head and fixing and positioning the screwdriver head stably.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a hand tool of the present invention;

FIG. **2** is an exploded view of a latch unit of the present invention;

FIG. **3** is an exploded view of a latch unit and a screwdriver head of the present invention;

FIG. **4** is a cross-sectional view of assembling a latch unit and a screwdriver head of the present invention;

FIG. **5** is a perspective view of a screwdriver head before its being latched by an elastic element in accordance with the present invention;

FIG. **6** is a perspective view of a screwdriver head after its being latched by an elastic element in accordance with the present invention;

FIG. **7** is a cross-sectional view of FIG. **6**;

FIG. **8** is an exploded view of a hand tool in accordance with another preferred embodiment of the present invention; and

FIG. **9** is a perspective view of a hand tool in accordance with another preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The technical contents of the present invention will become apparent with the detailed description of preferred embodiments accompanied with the illustration of related drawings as follows. It is noteworthy that same numerals are used for representing same respective elements in the drawings.

With reference to FIGS. **1** and **2** for a hand tool with a latch structure of the present invention, the hand tool of this preferred embodiment is a detachable screwdriver, but the invention is not limited to the detachable screwdriver only. The hand tool comprises a main body **10** and a latch unit **20**.

In this preferred embodiment, the main body **10** is a cylindrical handle made of a plastic material and manufactured by molding. However, the main body **10** is not limited to the aforementioned shape and material only, but any light material such as wood or aluminum of other shapes can be used in the invention as well. The main body **10** has a plurality of recesses formed on a surface of the main body **10** to provide friction and an anti-slip effect during the rotation of the screwdriver.

The latch unit **20** includes a rod body **21** and an elastic element **22**, wherein the rod body **21** is inserted into an end of the main body **10**, and the rod body **21** of this preferred embodiment is a hollow bar-shaped pipe and has a center hole **211** formed in an axial direction parallel to the rod body **21**, a positioning slot **212** formed at an end of the rod body **21** and away from the main body **10**, and a through hole **213** formed in the positioning slot **212** and communicated with the center hole **211**, and the through hole **213** disposed in an axial direction perpendicular to the rod body **21**.

The elastic element **22** is made of a rigid and elastic material such as metal and has a substantially C-shaped circular plate **221**, and a tongue **222** formed by bending from an end of the circular plate **221** towards the center of the circular plate **221**. During assembling, the of the circular plate **221** of the

elastic element **22** is entered from an end of the rod body **21** having the positioning slot **212** and limited by the positioning slot **212**, while the tongue **222** is passing from the through hole **213** into the center hole **211** (as shown in FIG. **3**).

With reference to FIG. **3** for a hand tool with a latch structure of the present invention, the hand tool further comprises a screwdriver head **30** detachably inserted into the center hole **211** of the rod body **21** and elastically clamped and positioned by the tongue **222**. The screwdriver head **30** comprises a clamped section **31**, and a first working section **32** and a second working section **33** respectively and axially extended from both ends of the clamped section **31**, and the clamped section **31** is a cylindrical body having a first guide slot **311** formed in a direction corresponsive to the first working section **32** and a second guide slot **313** formed in a direction corresponsive to the second working section **33**, wherein the first guide slot **311** and the second guide slot **313** are substantially L-shaped, and the first guide slot **311** has a first positioning pit **312** formed at an end of the first guide slot **311**, and the second guide slot **313** has a second positioning pit **314** formed at an end of the second guide slot **313** (as shown in FIG. **7**).

With reference to FIGS. **4** to **7**, the second working section **33** is held by fingers, and the first working section **32** is inserted into the center hole **211** of the rod body **21** for the use of the screwdriver. Until the clamped section **31** reaches the position of the tongue **222** of the elastic element **22**, the first guide slot **311** is aligned precisely with the tongue **222** and then pushed, such that when the tongue **222** is stopped by the turning corner of the first guide slot **311**, the screwdriver head **30** is rotated clockwise (as shown in FIG. **5**). Now, an end of the tongue **222** is entered into the first positioning pit **312** and then positioned due to the rotation of the screwdriver head **30**.

During operation, the main body **10** is rotated clockwise. Since the screwdriver head **30** has an end of the second working section **33** embedded into a thread of a screw (not shown in the figure). In a rotating process, a cut edge of an end of the first guide slot **311** and a wall of the through hole **213** of the rod body **21** are jointly clamped onto the tongue **222**, so that the screwdriver head **30** is driven to produce a clockwise rotation.

With reference to FIGS. **8** and **9** for a hand tool with a latch structure in accordance with another preferred embodiment of the present invention, the main body **10** and the rod body **21** are detachably coupled with each other, and an end of the rod body **21** is provided for being clamped and coupled by the elastic element **22**, and the other end of the rod body **21** is provided for installing and formed as a screwdriver head **30'** of another type (such as a Phillips, slotted or hex screwdriver head). During use, the rod body **21** is removed and the direction of the rod body **21** is switched before it is plugged back, and the other end of the rod body **21** is inserted into an insert hole of the main body **10** (as shown in FIG. **9**), so as to improve the diversified use of the hand tool.

In summation of the description above, the present invention achieves the expected objectives and overcomes the drawbacks of the prior art, and the invention complies with patent application requirements, and is thus duly filed for patent application.

While the invention has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope and spirit of the invention set forth in the claims.

What is claimed is:

1. A hand tool with a latch structure, comprising:

a main body (**10**); a latch unit (**20**), coupled to the main body (**10**), and including a rod body (**21**) and an elastic element (**22**), and the rod body (**21**) having a center hole (**211**) formed in an axial direction parallel to the rod body (**21**), and a through hole (**213**) formed in axial direction perpendicular to the rod body (**21**) and communicated with the center hole (**211**), and the elastic element (**22**) having a circular plate (**221**) and a tongue (**222**) formed by bending from an end of the circular plate (**221**), and the circular plate (**221**) being clamped outside the rod body (**21**), and the tongue (**222**) passing from the through hole (**213**) into the center hole (**211**);

screwdriver head (**30**) comprising a clamped section (**31**) having a cylindrical body with first guide slot (**311**) formed on the cylindrical body and in a direction corresponsive to the first working section (**32**) and a second guide slot (**313**) formed on the cylindrical body and in a direction corresponsive to the second working section (**33**), wherein the first guide slot (**311**) further includes a first positioning pit (**312**) formed at an end of the first guide slot (**311**) for accommodating the tongue (**222**), and the second guide slot (**313**) further includes a second positioning pit (**314**) formed at an end of the second guide slot (**313**) for accommodating the tongue (**222**).

2. The hand tool with a latch structure according to claim **1**, wherein the rod body (**21**) has a positioning slot (**212**) formed at an end of the rod body (**21**) that is away from the main body (**10**), and the circular plate (**221**) is elastically clamped into the positioning slot (**212**) of the rod body (**21**).

3. The hand tool with a latch structure according to claim **1**, wherein the circular plate (**221**) is substantially C-shaped.

4. The hand tool with a latch structure according to claim **3**, wherein the tongue (**222**) is formed by bending from the end of the circular plate (**221**) towards the center of the circular plate (**221**).

5. The hand tool with a latch structure according to claim **1**, wherein the hand tool is a detachable screwdriver further comprising a screwdriver head (**30**) detachably inserted into the center hole (**211**) of the rod body (**21**).

6. The hand tool with a latch structure according to claim **5**, wherein the screwdriver head (**30**) further comprises a first working section (**32**) and a second working (**33**) extended axially and respectively from both ends of the clamped section (**31**).

7. The hand tool with a latch structure according to claim **1**, wherein the first guide slot (**311**) and the second guide slot (**313**) are substantially L-shaped.

8. The hand tool with a latch structure according to claim **1**, wherein the main body (**10**) and the rod body (**21**) are detachably coupled to one another.

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